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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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			EXAMINER TADAYYON ESLAMI, TABASSOM	
			ART UNIT 1709	PAPER NUMBER
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/529,258

Applicant(s)

GUSSONE ET AL.

Examiner

TabassomT Tadayyon-Eslami

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 September 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☐ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 03/25/2005.
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- ☐ Notice of Informal Patent Application
- ☐ Other: _____

Specification

The abstract of the disclosure is objected to because there is a typo error.

Correction is required. See MPEP § 608.01(b).

In [006] 5th line the word "pre-treated" is spelled wrong.

In [0018] line 4, the word "are" spelled wrong.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-3, 5-7 are rejected under 35 U.S.C. 102(b) as being anticipated by Carl Shumaker et al., (US Patent # 5650059) here after Shumaker.

Shumaker teaches,

Element having a substrate of a hard metal or cermets comprising hard material particles and binding material [column 3 line 15]

and a diamond layer [column 3 line 19],

wherein the diamond layer is disposed over a first region of intact substrate material within which hard material particles are surrounded by binding material [column 3 line 14]

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wherein the transition region of the first region, which is disposed towards the diamond layer, comprises a depth profile having indents and elevations (It means the transition area is rough, [fig. 2 shows the rough transition region],

and wherein the diamond layer is braced with the substrate material such that portions of the diamond layer are disposed deeper in the substrate than elevations of the first region [fig. 2]

characterized in that:

between the first region and the diamond layer there is disposed a porous zone in which hard material particles are free of binding material [column 4 line26 and column 5, line13],

and

wherein the hard material particles form an intact hard material particle structure within the porous zone and are not weakened at the grain edges by etching [the etching process that Shumaker teaches, only removes the binding materials, therefore the carbide grains will not be round and maintain sharp and intact hard [fig. 7]] .

Claim 2 is rejected since Shumaker teaches the porous zone to a depth up about 15 micron, or 1-5 micron [column 3, line 26].

Claim 5 rejected since Shumaker teaches the substrate material contains WC particles and Co binder, wherein the binder material contains 3-12% cobalt [column 1, line 47].

Claims 3, 6 and 7 are rejected. Shumaker teaches,

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Element according claim 1 (it was explained previously that Shumaker teaches the limitation of claim 1) wherein the porous zone comprises an average thickness d (10 μm , in fig. 1)[column 4, line 19], the depth profile of the transition region of the first region comprises an average peak-to-valley height R_z and maximum peak-to-valley height R_{max} and wherein d is less than or equal to R_{max} (attached fig. 1 of Shumaker reference shows R_{max} for three of the peaks to valleys height (# 8, 9 and 10) are about the height of the porous zone, therefore, claim 3 is rejected.

Claim 6 is also rejected. Further analysis of fig. 1 in Shumaker reference shows in fact the average peak-to-valley height R_z is about 7.20 μm which is between 2 and 10 μm . Therefore claim 6 is rejected.

Claim 7 is also rejected. Further analysis of fig. 1 in Shumaker reference shows in fact the average peak-to-valley height R_z is about 7.20 μm which is greater than the grain size of the hard material (fig.1 shows the largest grain size is about 3.72 μm). Therefore claim 7 is rejected.

Claims 12, 14 and 20 are rejected under 35 U.S.C. 102(b) as being anticipated by Yixiong Liu et. al. (U.S. Patent Application # 2003/0049434), here after Liu,

Liu teaches a method for coating a substrate material with a diamond layer (wherein the substrate comprises hard material particles (WC) and surrounding binding (Co) [0008] wherein in first step a selective etching of the binding material is executed [0106],

Hard material particles are removed in a subsequent mechanical removal step by means of a blasting process with blasting particles [[0109],

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and the substrate in afterwards coated with a diamond layer [0110].

Claim 14 rejected since Liu teaches cleaning step (washing and rinsing) before the coating [0108].

Claim 20 rejected since Lin disclosed using solution comprising sulfuric acid [claim 17].

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 4 rejected under 35 U.S.C. 103(a) as being unpatentable over Carl Shumaker et al., (U.S. Patent # 5650059) here after Shumaker and further in view of Geoffrey W. Meadows et. al. (U.S. Patent # 3451791) here after Meadows,

Shumaker teaches the limitation of claim 1 as discussed above, it further teaches the substrate material contains WC hard material particles and a binder containing Co [column 5,line 12]. Shumaker does not teach the grain size of the hard material particles is less than 0.8 um. Meadows further teach Cobalt bounded Tungsten carbide, where the average grain size of WC less than 0.5 um [column 4, 73]. Therefore it would have been obvious to one of ordinary skill in the art at the time of invention was made to have a substrate of a hard metal and a diamond film over it which meet the limitation of claim

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1 and further the grain size of the hard material (WC) be less than 0.5 um because it makes dense bodies of tungsten carbide.

Claim 8 - 11,16 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Deepak G. Bhat et.al. (U.S. Patent# 5713133) here after Bhat further in view of Michael G. Peters et. al. (U.S. Patent: 5236740), here after Peters,

Bhat teaches,

Method for coating a substrate material with a diamond layer wherein the substrate material contains hard material particles (WC) and binding material (Co) wherein,

A binding material –selective etching is executed in a first step, wherein the binding material in a border zone of the substrate is removed [column 5, line 4].

A hard material –selected etching is executed in a second step, wherein the hard material particles in the border zone are completely removed [column 5, line 25] so that a surface profile with elevations and indents is created [fig. 3] and the substrate coated with diamond layer thereafter [column 5, line 38],

Bhat does not explicitly teaches the third step of the etching for removing the binding material concentration on the surface, however Peters discloses the etching step after etching WC grains, in order to enhance the diamond coating adhesion [abstract]. Etching cemented tungsten carbide without removing the binder and then second step of etching to remove the residues from the surface [column 3, line 31],

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention was made to have a method for coating a substrate material with a

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diamond layer wherein the substrate material contains hard material particles and binding material which the binding material will etch first following by etching the hard material particle and at last there would be a third step to remove the residues and the binding materials on surface and deposit the diamond layer, because the diamond layer will adhesion to the substrate will improve with this method.

Claim 9 is rejected, Bhat and Peters teach the limitation of claim 8 and Bhat further teach the depth of first step etching is approximately 3 microns [column 5, line 16]. Peters does not teach an etching depth for the residue removal step. However peter disclosed the process for removing any residue remaining on the surface [column 2, line 60]. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention was made to have a method for diamond coating of a hard materials which meet the limitation of claim 8 and the third step of etching comprising lesser etching depth than the first step, because removing the surface residues means removing less than a micron (a couple mono layers) from the surface.

Claim 10 rejected since Bhat teaches the limitation of claim 8 and it further discloses using of solvent comprising caustic soda (NAOH) to etch the WC (second step of etching) [column 5, line 32].

Claim 11 rejected. Bhat and Peters teach the limitation of claim 8 and Peters further discloses using of solvent comprising sulfuric acid and hydrogen peroxide [column 6, line 16] for removing the surface residues (third step etching) [column 3, line 39]. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention was made to have a method for coating a substrate material with a diamond

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layer wherein the substrate material contains hard material particles (WC) and binding material (Co) wherein the third step of etching comprises solvent comprising sulfuric acid and hydrogen peroxide

Claim 16 rejected. Bhat and Peters teach the limitation of claim 8 and Bahat further teaches etching depth to be 2-10 um (8 um) [table 1, the example 9].

Claim 18 rejected. Bhat and Peters teach the limitation of claim 8 and Bahat further teaches the diamond film to be deposited through CVD [abstract].

Claim 13 rejected under U.S.C. 103(a) as being anticipated by Yixiong Liu et. al. (U.S. Patent Application # 2003/0049434), here after Liu, further in view of Michael G. peters et. al (U.S. Patent: 5236740).

Liu teaches the limitation of claim 12 as explained above. Peters further teaches,

A method for coating a substrate (Co-bonded WC) with diamond film [abstract] wherein the material-selective etching step is executed after mechanical removal step [column 4, example 2, third sample]. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention was made to have a method for coating a substrate material with a diamond layer which meets the limitation of claim 12 and further the binding material –selective etching step is executed after the mechanical removal step because it is possible to improve the adhesion property of the diamond film to WC substrate with this method.

Claim 15 is rejected U.S.C. 103(a) as being anticipated by Yixiong Liu et. al. (U.S. Patent Application # 2003/0049434), here after Liu, further in view of Frank H. Phillips et. al. (U.S. Patent: 6004189) here after Phillips,

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Liu teaches the limitation of claim 12 as mentioned above. Liu does not teach the mechanical removal particles consist of SiC. Phillips teaches polishing the WC surface with SiC [column 7, line 27]. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention was made to have a method for coating a substrate material with a diamond layer which meets the limitation of claim 12 and the blasting particles consists of SiC particles.

Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable Deepak G. Bhat et.al. (U.S. Patent# 5713133) here after Bhat further in view of Carl Shumaker et al., (US Patent # 5650059) here after Shumaker.

Bhat teaches the limitation of claim 8 as explained above. Bhat does not teach the etching of cobalt binding with hydrochloric acid and hydrogen peroxide. Shumaker however teaches a method for etching the cobalt in cobalt binding WC comprising the step of etching with solvent comprising hydrogen peroxide and hydrochloric acid [column 3, line 45]. Therefore it would have been obvious to one of ordinary skill in the art at the time of invention was made to have a method for coating a substrate material with a diamond layer wherein the substrate material contains hard material particles and binding material which meet the limitation of claim 8 and further the first step of etching (etching the cobalt binding) would be with solvent comprising of hydrogen peroxide and hydrochloric acid, because it is possible to remove the cobalt from C0-WC with this method.

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Claim 19 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yixiong Liu et. al. (U.S. Patent Application # 2003/0049434), here after Liu, further in view of

Deepak G. Bhat et.al. (U.S. Patent# 5713133) here after Bhat. Liu teaches the limitation of claim 12 as explained above. Liu does not teach the etching depth for the first step (binding removal) to be 1-20 um. Bhat further teaches etching depth to be 2-10 um (8 um) [table 1, the example 9]. Therefore it would have been obvious to one of ordinary skill in the art at the time of invention was made to have a method for coating a substrate material with a diamond layer which meets the limitation of claim 12 and the etching depth for the first step of etching (binding removal) be between 1-20 um.

Claim 21 rejected. Liu teaches the limitation of claim 12 as explained above. Liu does not teach that the diamond thin film is deposited through CVD method. Bhat further teaches a Method for coating a substrate material with a diamond layer wherein the substrate material contains hard material particles (WC) and binding material (Co) wherein the diamond layer is deposited through CVD method [abstract]. Therefore it would have been obvious to one of ordinary skill in the art at the time of invention was made to have a method for coating a substrate material with a diamond layer which meets the limitation of claim 12 and the diamond film is deposited through CVD method because it is possible to make a diamond coated bonded tungsten carbide with this method.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to TabassomT Tadayyon-Eslami whose telephone number is 571-270-1885. The examiner can normally be reached on 7:30-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Cleveland can be reached on 571-272-1418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

T.T


MICHAEL B. CLEVELAND
SUPERVISORY PATENT EXAMINER